U.S. DEPARTMENT OF COMMERCE
National Technical Information Service

PB-247 777

GUIDELINES FOR AIR QUALITY MAINTENANCE PLANNING AND ANALYSIS - VOLUME 13. ALLOCATING PROJECTED EMISSIONS TO SUBCOUNTY AREAS. SUPPLEMENT NO. 1. ACCOUNTING FOR NEW SOURCE PERFORMANCE STANDARDS IN PROJECTING AND ALLOCATING EMISSIONS - HYPOTHETICAL EXAMPLE

ENVIRONMENTAL PROTECTION AGENCY

OCTOBER 1975

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EPA-450/4-74-014-b
October 1975

PB 247 777

ACCOUNTING FOR NEW SOURCE PERFORMANCE STANDARDS IN PROJECTING AND ALLOCATING EMISSIONS -HYPOTHETICAL EXAMPLE-

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Air and Waste Management
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

TECHNICAL REPORT DATA

EPA-450/4-74-014-b	2. RECIPIENT'S ACCESSION NO.
4. TITLE AND SUBTITLE Guidelines for Air Quality Maintenance Planning and Analysis, Volume 13: Allocating Projected Emissions to Subcounty Areas; Supplement No. 1	5. REPORT DATE September 1975 6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) David Sanchez and John Silvasi	8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Environmental Protection Agency Office of Air and Waste Management Office of Air Quality Planning and Standards Research Triangle Park, N.C. 27711	10. PROGRAM ELEMENT NO. 11. CONTRACT/GRANT NO.
12. SPONSORING AGENCY NAME AND ADDRESS	13. TYPE OF REPORT AND PERIOD COVERED Final 14. SPONSORING AGENCY CODE

15. SUPPLEMENTARY NOTES

Part of a 13-volume series

16. ABSTRACT

Supplement No. 1 of Volume 13: Allocating Projected Emissions to Sybcounty Areas, presents a hypothetical example of how to account for future new source performance standards in projecting and allocating emissions. The supplement also presents a general methodology for considering these future new source performance standards in the projection and allocation techniques.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Air Pollution Atmosphere Contamination Control	Air quality maintenance plans Emission inventories Forecasting emissions Subcounty Emissions allocation techniques	13-B

PRICES SUBJECT TO CHANGE

18. DISTRIBUTION STATEMENT Unlimited	19. SECURITY CLASS (This Report) Unclassified	21. NO. OF PAGES 73
i.	20. SECURITY CLASS (This page) Unclassified	22. PRICE $1.00-2.25

EPA Form 2220-1 (9-73)

EPA-450/4-74-014-b

ACCOUNTING FOR NEW SOURCE PERFORMANCE STANDARDS IN PROJECTING AND ALLOCATING EMISSIONS -HYPOTHETICAL EXAMPLE-

[A Supplement to Guidelines for Air Quality Maintenance Planning and Analysis - Volume 13: Allocating Projected Emissions to Subcounty Areas (EPA-450/4-74-014)]

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Air and Waste Management
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October 1975

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PUBLICATION No. EPA-450/4-74-014-b

ACCOUNTING FOR NEW SOURCE PERFORMANCE STANDARDS
IN PROJECTING AND ALLOCATING EMISSIONS
- HYPOTHETICAL EXAMPLE -

BACKGROUND

Volume 13: Allocating Projected Emissions to Subcounty Areas of the Guidelines for Air Quality Maintenance Plannning and Analysis was published before estimated New Source Performance Standards (NSPS) emission data and time schedules were available for consideration; for that reason this information was not used in developing the general methodology presented in the Industrial Emissions Section, 3.4, of the Guideline. This attachment supplements Volume 13 and demonstrates how consideration of the Federal NSPS should be incorporated into the emission estimates needed to carry through the subcounty allocation procedures of Volume 13. It is noted that the general procedure described below parallels the consideration given to incorporating NSPS information into Volume 7; Projecting County Emissions of the Guidelines. An excerpt from Volume 7 of the Guidelines explaining the applicability of the NSPS and effect on projected emissions is included as an attachment to this supplement. The reader should also be aware of the most recent proposal concerning the definition of "modification" as it relates to NSPS applicability (39 FR 36946).

The net effect upon the methodology developed in Section 3.4 of Volume 13 of considering NSPS is to require intermediate year calculations of new emissions from all industrial point sources for which NSPS will exist. (The reader should review pages 87 through 99 of Section 3.4.1 of Volume 13 in order that the development which follows may be better understood.) The estimates would be in addition to the suggested analysis years of 1975, '80, '85.

For example, assume the following industrial point sources existed in the county of consideration:

ABC Steel Company - Basic oxygen furnace (BOF)
DEF Copper Company - Smelter
GHI Clay Products Company - Complex of sources.

Assume also that NSPS are applicable to these sources in the years 1977, 1978 and 1983 respectively. Hence, intermediate calculations of emissions in addition to those suggested in Volume 13 would be needed as follows:

-- Steel Company BOF from 1975-1976 and 1977-1980
-- Copper Company Smelter from 1975-1977 and 1978-1980
-- Clay Products Company emissions from 1980-1982 and 1983-1985.

For the purpose of general model development it is assumed that the effective date for the NSPS will commence on January 1 of the specified calendar year, and that emissions relate to end-of-year results.

The generalized equation for determining the effect on emissions of a NSPS (or a more stringent State or local regulation) that becomes effective in year i is:

$$E_S = E_0 \, GF_{0,i-1} \, [1 + CGR_{i,5} + RF_i(NGR_{i,5}) - (RR_{i,5})(1 - RF_i)] \qquad (1)$$

where:

E_5 = Emission rate for the 5th year following the base year.

E_0 = Emission rate in the base year.

$GF_{0,i-1}$ = The growth factor (expressed as a decimal) for the period from the base year, 0, to the $(i-1)^{th}$ year. $GF_{0,i-1} = (1 + r)^n$, where r is the applicable annual growth rate expressed as a decimal and n is the number of years in the growth period.

$CGR_{i,5}$ = The growth rate for emission attributable to increasing production activity up to full capacity for the period from the beginning of the ith year to the end of year 5. $CGR_{i,5}$ cannot exceed the unused capacity, expressed as a fraction, available for production in year i. $CGR_{i,5} = (1 + r)^n - 1$.

RF_i = The reduction factor for all applicable emissions due to regulations applied in year i, RF_i = NER/PER where NER is the emission rate allowed under new regulations and PER is the emission rate allowed under the previous regulation. In many cases, the emission rate under the new regulations will be the NSPS; where State regulations are more stringent, however, NER will be the State regulation.

$NGR_{i,5}$ = The growth rate for the period from the beginning of year i to the end of year 5 applicable to those emissions which are covered by new emission regulations, either NSPS or more stringent State regulations. $NGR_{i,5} = (1 + r)^n - 1$.

$RR_{i,5}$ = The retirement and replacement rate for the period from the beginning of year i to the end of year 5 (expressed as a decimal). $RR_{i,5} = (1 + R)^n - 1$ where R is the annual retirement rate (expressed as a decimal) for equipment for which NSPS or State emission standards are applicable; n is the number of years in the period from year i to year 5.

In the case where all emissions growth is attributable to new equipment or modifications (utilization of unused capacity equals zero) and the equipment retirement and replacement rate is zero, equation 1 simplifies to:

$$E_5 = E_0 \, GF_{0,i-1} \, [1 + RF_i(NGR_{i,5})] \qquad (2)$$

Where the NSPS or more stringent State emission standards are applicable to all growth and modifications within a five year analysis period, and the growth assumptions and retirement rate assumptions of equation (2) above hold, equation (2) becomes:

$$E_5 = E_0(1 + RF_0 \, NGR_{0,5}) \qquad (3)$$

Finally in the case of estimating emission projections for a five year analysis period where no NSPS or more stringent State emission regulations become applicable the above equation simplifies to:

$$E_5 = E_0 G_{0,5} \qquad (4)$$

where:

$G_{0,5}$ = The growth factor for the 5 year projection interval.

INTRODUCTION

This discussion presents a hypothetical example of a method for taking EPA's anticipated new source performance standards (NSPS) into account when projecting industrial emissions using EPA's Guidelines for Air Quality Maintenance Planning and Analysis, Volume 13: Allocating Projected Emissions to Sub-County Areas. A list of EPA's best estimates of anticipated NSPS and the approximate dates by which they are expected to take effect are given in Table 1. These estimates have no legal basis because the standards must be subjected first to further investigation and then to EPA's procedures for rulemaking. The estimates presented in Table 1 are thus subject to change. EPA advises States to use the latest update of these estimates, which may be obtained from EPA regional offices for use in the analysis of, and plan development in, air quality maintenance areas under 40 CFR 51.12.

ASSUMPTIONS FOR THE EXAMPLE

1. Assume that in County XYZ, Subarea A, three existing sources of emissions subject to NSPS are the ABC Steel Company's iron and steel basic oxygen furance (BOF), the DEF Copper Company's primary copper (CU) smelter, and the GHI Clay Company's clay products plant. These hypothetical source categories were chosen to demonstrate how different effective dates for NSPS affect the projection of emissions. From Table 1, the following information is obtained for these three source categories:

Source category	SCC code	Effective date (year)	Estimated NSPS				
			Part. matter	SO_x	NO_x	CO	HC
Iron and steel mills (BOF)	3-03-009-03	1977	0.022 gr/dscf (99.8% control)				
Primary copper smelters (roaster, furnace, converter)	3-03-005-(01-05)	1978		38 lb/ton of metal produced (99.5% control)			
Clay products	3-05-008-(01-03) 3-05-009-(02-03) 3-05-003-(01-06)	1983	4.5 lb/ton of product produced				

2. The example sources have the following characteristics:

Source	Flow rate of exhaust gases or production rate	Existing emission limitation	Baseline (1975) emissions*
ABC Steel CO. BOF (current employment = 200)	1.06×10^6 dscf/min (1000 hours of operation/year)	Particulate matter: 1.1 gr/dscf	Particulate matter: 5000 tons/year CO: 1000 tons/year
DEF Copper CO. Primary Copper Smelter (current employment = 200)	2600 tons metal produced/year	SO_2: 380 lb/ton metal produced	SO_2: 500 tons/year Particulate matter: 50 tons/year
GHI Clay Products Co. (current employment = 100)	50,000 tons of product/year	Particulate matter: 10 lb/ton of product	Particulate matter: 250 tons/year

*Assume that these sources are in compliance with existing regulations.

3. The baseline (1975) emissions are entered into Table 3.4-1 from Volume 13. The completed Table 3.4-1 also includes location coordinates and employment figures for the hypothetical sources. (Actually, a separate Table 3.4-1 should be completed for each industrial process category; in this example, three source categories are entered into one table for brevity.) The growth factor for the baseline year (1975) is assumed to be one (1).

4. The total growth in emissions is due entirely to increased production from new or modified equipment. That is, the utilization of unused plant capacity is zero.

5. The equipment retirement and replacement rate for the example facilities is zero for the analysis periods.

CALCULATION OF FUTURE EMISSIONS FOR INDIVIDUAL EXISTING POINT SOURCES - (RESULTS ENTERED INTO TABLE 3.4-1 FOR DIFFERENT YEARS)
VOL. 13 - ORDER 1 ANALYSIS: GROWTH ALLOCATED TO EXISTING SOURCES

1980 Emissions

1. Iron and Steel (BOF) - ABC Steel Company. Assume that the source has an annual growth rate of 2.0 percent;

a. Particulate matter - NSPS will only control sources in this category for 1977 and beyond. The following are the input for equation (1):

$E_0 = E_{1975} = 5{,}000$ tons/year

$GF_{0,i-1} = GF_{1975,\,1976} = 1.02$

$RF_1 = RF_{1977} = \frac{0.022 \text{ gr/dscf}}{1.1 \text{ gr/dscf}} = 0.02$

$NGR_{i,5} = NGR_{1977,\,1980} = (1 + 0.02)^4 - 1 = 0.082.$

Entering these into equation (2) yields:

$$E_5 = E_{1980} = (5000 \text{ tons/year})\ (1.02)\ [1 + (0.02)\ (0.082)]$$
$$= 5108 \text{ rounded to } 5110 \text{ tons/year.}$$

b. Carbon monoxide - No NSPS will control carbon monoxide emissions. The growth factor for the 5-year period, 1976-1980, will be:

$$(1 + 0.02)^5 = 1.104.$$

Therefore, using equation (4), the emissions in 1980 will be:

$$E_5 = E_{1980} = (1000 \text{ tons/year})\ (1.104) \cong 1100 \text{ tons/year.}$$

2. Primary Copper Smelter - DEF Copper Company. Assume that the source has an annual growth rate of 3 percent.

a. Sulfur dioxide - The NSPS will not control sources in this category until 1978. The following are the input for equation (2):

$$E_0 = E_{1975} = 500 \text{ tons/year}$$
$$GF_{0,i-1} = GF_{1975,\ 1977} = (1 + 0.03)^2 = 1.061$$
$$RF_i = RF_{1978} = \frac{38 \text{ lb/ton of metal produced}}{380 \text{ lb/ton of metal produced}} = 0.10$$
$$NGR_{1,5} = NGR_{1978,\ 1980} = (1 + 0.03)^3 - 1 = 0.093.$$

Entering these into equation (2) yields:

$$E_5 = E_{1980} = (500 \text{ tons/year})\ (1.061)\ [1 + (0.10)\ (0.093)]$$
$$\cong 536 \text{ tons/year.}$$

b. Particulate matter - No NSPS will control particulate matter emissions from this source category, and therefore, the 1980 emissions can be calculated directly using equation (4). The growth factor for the 5-year period, 1976-1980, is:

$(1 + 0.03)^5 = 1.159$

Therefore, 1980 emissions will be

$E_5 = E_{1980} = (50 \text{ tons/year})\ (1.159) \cong 58 \text{ tons/year}.$

3. Clay Products - GHI Clay Company. Assume that this source has an annual growth rate of 2.5 percent. NSPS will not apply until 1983. Therefore, the growth in emissions over the first five years can be calculated directly using equation (4). The 5-year growth factor is:

$(1 + 0.025)^5 = 1.131.$

Therefore, the 1980 emissions will be:

$E_5 = E_{1980} = (250 \text{ tons/year})\ (1.131) \cong 283 \text{ tons/year}.$

4. Summary - The above results are entered into columns 7-11 of Table 3.4-1 for 1980. The 1980 employment for each source is the product of the 1975 employment for the source and the growth factor for 5 years for the source; the 1980 employment is entered into column 12, of Table 3.4-1.

1985 Emissions

1. Iron and Steel (BOF) - ABC Steel Company. Again assume an annual growth rate of 2.0 percent.

a. Particulate matter - Because the NSPS started to control sources in 1977, equation (3) is used; the inputs for equation (3) are:

$E_0 = E_{1980} = 5110$ tons/year

$NGF_{0,5} = NGF_{1980,\ 1985} = (1 + 0.02)^5 - 1 = 0.104$

$RF_0 = RF_{1975} = 0.02.$ (from page 8)

Inserting these into equation (3) yields:

$E_5 = E_{1985} = (5110 \text{ tons/year})\ [1 + (0.104)\ (0.02)]$

$= 5121$ tons/year.

b. Carbon monoxide - The growth factor for the 5-year period, 1981-1985, is:

$(1 + 0.02)^5 = 1.104.$

Therefore, using equation (4) the 1985 emissions are:

$E_5 = E_{1985} = (1100 \text{ tons/year})\ (1.104) \cong 1210$ tons/year.

2. Primary Copper Smelter - DEF Copper Company, assume again an annual growth rate of 3 percent.

a. Sulfur dioxide - Because the NSPS started to control sources in 1978, equation (3) is used; the inputs are:

$E_0 = E_{1980} = 536$ tons/year

$NGR_{0,5} = NGR_{1980,\ 1985} = (1 + 0.03)^5 - 1 = 0.159$

$RF_0 = RF_{1980} = 0.10.$ (from page 9)

Entering these into equation (3) yields:

$E_5 = E_{1985} = 536 \text{ tons/year}\ [1 + (0.159)\ (0.10)]$

$\cong 545$ tons/year.

b. Particulate matter - Since no NSPS controls sources in this category the 1985 emissions are calculated directly using equation (4) as

$E_5 = E_{1985} = (58 \text{ tons/year})\ (1.159) \cong 67 \text{ tons/year}.$

3. Clay Products - GHI Clay Company. The NSPS will apply to this source in 1983. Again assume an annual growth rate of 2.5 percent. Equation (2) is used with the following inputs:

$E_0 = E_{1980} = 283 \text{ tons/year}$

$GF_{0,i-1} = GF_{1980,\ 1982} = (1 + 0.025)^2 = 1.051$

$RF_i = RF_{1983} = \frac{4.5 \text{ lb/ton of product}}{10 \text{ lb/ton of product}} = 0.45$

$NGR_{i,5} = NGR_{1983,\ 1985} = (1 + 0.025)^3 - 1 = 0.077.$

Entering these into equation (2) yields:

$E_5 = E_{1985} = (283 \text{ tons/year})\ (1.051)\ [1 + (0.45)\ (0.077)]$
$\cong 307 \text{ tons/year}.$

4. Summary - The above results are entered into columns 7-11 of Table 3.4-1 for 1985. The 1985 employment for each source is the product of the 1980 employment for the source and the growth factor for 5 years for the source; the 1985 employment is entered into Column 12, Table 3.4-1.

CALCULATION OF FUTURE EMISSIONS FOR ALL (EXISTING AND NEW) SOURCES VOL. 13 - ORDER 2 and 3 ANALYSIS: GROWTH ALLOCATED TO NEW AND EXISTING SOURCES (RESULTS ENTERED INTO TABLE 3.4-2)

1. Assume that for the hypothetical county, XYZ, the baseline year emissions from existing point sources and the employment from those sources are as given in Table 3.4-2, columns 2-7 (this information

is obtained by summing emissions and employment over all individual sources in each process category for Table 3.4-1; note that the Table 3.4-1 previously constructed is only partially complete in the context of the following example.)

2. Assume that in this hypothetical example, one-half of the increase in emissions and employment for the county for all industrial process categories is due to new sources at new locations and the other half is due to new sources and modifications at existing locations.

1. Iron and Steel - BOF

Assume for this hypothetical case an annual growth rate for the category of 2.5 percent.

a. Particulate matter - The NSPS will control sources in this category for 1977 and beyond for new emissions. Equation (2) is used with the following input:

$E_0 = E_{1975} = 15{,}000$ tons/year

$GF_{0,i-1} = GF_{1975,\ 1976} = 1.025$

$RF_i = RF_{1976} = \frac{0.022\ gr/dscf}{1.1\ gr/dscf} = 0.02$

$NGR_{i,5} = NGR_{1977,\ 1980} = (1 + 0.025)^4 - 1 = 0.104.$

Entering these into equation (2) yields:

$E_5 = E_{1980} = (15{,}00\ tons/year)\ (1.025)\ [1 + (0.02)\ (0.104)]$

$\cong 15{,}400$ tons/year.

b. Carbon monoxide - No NSPS will control. Therefore, the growth factor for the 5-year period, 1976-1980, will be:

$(1 + 0.025)^5 = 1.131.$

Therefore, using equation (4), the 1980 emissions are:

$E_5 = E_{1980} = (3000 \text{ tons/year})\ (1.131) \cong 3400 \text{ tons/year}.$

2. Primary Copper Smelters - Assume for this hypothetical case an annual growth rate of 3.5 percent for the category.

a. Sulfur dioxide - The NSPS will not control until 1978. Equation (2) is used with the following input:

$E_0 = E_{1975} = 2000 \text{ tons/year}$

$GF_{0,i-1} = GF_{1975,\ 1977} = (1 + 0.035)^2 = 1.071$

$RF_i = \dfrac{38 \text{ lb/ton of metal produced}}{380 \text{ lb/ton of metal produced}} = 0.10$

$NGR_{i,5} = NGR_{1978,\ 1980} = (1 + 0.035)^3 - 1 = 0.109.$

Inserting these into equation (2) yields:

$E_5 = E_{1980} = (2000 \text{ tons/year})\ (1.071)\ [1 + (0.10)\ (0.109)]$

$\cong 2160 \text{ tons/year}.$

b. Particulate matter - No NSPS controls sources of particulate matter in this category. The growth factor for the 5-year period, 1975-1980, is

$(1 + 0.035)^5 = 1.188.$

Therefore using equation (4) the 1980 emissions are

$E_5 = E_{1980} = (200 \text{ tons/year})\ (1.188) \cong 238 \text{ tons/year}.$

3. Clay Products - Assume for this hypothetical case an annual growth rate of 3.0 percent for the category. The NSPS will not apply until 1983. The growth factor for the 5-year period, 1975-1980, is:

$$(1 + 0.03)^5 = 1.159.$$

The 1980 emissions using equation (4) are calculated as:

$$E_5 = E_{1980} = (1000 \text{ tons/year})\ (1.159) \cong 1160 \text{ tons/year}.$$

4. Employment - Growth in employment is calculated as the product of the 5-year growth factor between 1975 and 1980 and the 1975 employment.

a. Iron and Steel - BOF - Assume an annual growth rate of 2.5 percent. Therefore, the 5-year growth rate is:

$$(1 + 0.025)^5 - 1 = 1.131-1 = 0.131 \text{ (equivalent to 13.1\%)}.$$

Since the baseline year employment is 600, the growth in employment is:

$$(600)\ (0.131) \cong 80.$$

Therefore, the total employment for 1980 for all sources in the category for the county is 680 (entered into column 14). Since half of the new employment (40) will occur in new sources, 40 is entered into column 26; the remaining 40 will be placed with the employment at existing sources (600 + 40 = 640) and entered into column 20 of Table 3.4-2.

b. Primary Copper Smelter - Assume an annual growth rate of 3.5 percent. Therefore, the 5-year growth rate is:

$$(1 + 0.035)^5 - 1 = 0.188 \text{ (equivalent to 18.8\%)}.$$

Since the baseline year employment is 800, the growth in employment is:

$$(800)\ (0.188) \cong 150.$$

Therefore, the total employment for 1980 for all sources in the category in the county is 950 (entered into column 14). Since half of the new employment (75) will occur in new sources, 75 is entered into column 26; the remaining 75 will be placed with the employment at existing sources (800 + 75 = 875) and entered into column 20.

c. Clay Products - The annual growth rate is 3.0 percent. Therefore, the 5-year growth rate is:

$(1 + 0.03)^5 - 1 = 0.159$ (equivalent to 15.9%)

Since the baseline year employment is 400, the growth in employment is:

$(400)\ (0.159) \cong 64.$

Therefore, the total employment for 1980 for all sources in the category in the county is 464 (entered into column 14). Since half of the new employment (32) will occur in new sources, 32 is entered into column 26; the remaining 32 will be placed with the employment at existing sources (400 + 32 = 432) and entered into column 20.

5. Summary - The resulting emissions from above are entered into the appropriate places in columns 9 to 13 of Table 3.4-2 for the year 1980. As aforementioned, Table 3.4-2 is usually completed by entering the 1980 emissions and employment from existing sources (from Table 3.4-1 for 1980) into columns 15 to 20. In this hypothetical example, however, Table 3.4-1 lists only 3 sources for simplicity and was constructed to illustrate consideration of the NSPS. For that reason,

the 1980 emissions and employment calculated from existing sources and entered into columns 15 to 20 of Table 3.4-2 do not relate to the previously constructed Table 3.4-1 but rather to the assumed scheme concerning new location and existing location stated above. The entries for columns 21 to 26 are the differences between the appropriate entries in columns 9 to 14 and columns 15 to 20.

CALCULATION OF FUTURE EMISSIONS BY PROCESS CATEGORY AND SUBAREA
VOLUME 13 - ORDER 2 AND 3 ANALYSIS: EMISSIONS ALLOCATED BY PROCESS CATEGORY AND SUBAREA (RESULTS ENTERED INTO TABLE 3.4-3)

1980

1. The hypothetical 1980 employment data for the three process categories for Subarea A of county XYZ are presented in columns 2 and 3 of Table 3.4-3. In an actual calculation, the data for column 2 would be obtained from area planning studies, and the data for column 3 would be obtained from column 12 of Table 3.4-1. Column 4 is the difference between column 2 and column 3.

2. The Employment Allocation Proportion (EAP) is calculated as the ratio:

$$\frac{\text{Subarea Category New Source Employment (from column 4)}}{\text{County Total Category New Source Employment (from column 26, Table 3.4-2)}}.$$

These ratios are entered into column 5.

3. The new source emissions for each subarea are then calculated as the product of the EAP and the projected emissions for the whole county (columns 21-25, Table 3.4-2). The results are entered into columns 6-10 as shown.

SUBAREA SUMMARY

VOL. 13 - ORDER 1, 2 AND 3 ANALYSIS: SUMMARY OF EMISSION BY SUBAREA (RESULTS ENTERED INTO TABLE 3.4-4).

1980 Emissions

1. The existing point source emissions for county XYZ, Subarea A for 1980 are here assumed for the hypothetical case (columns 4-8); in actual practice, this information is taken from Table 3.4-1.

2. The 1980 new source emissions (columns 10-14) are taken from Table 3.4-3, columns 6-10.

3. The total 1980 emissions (columns 16-20) are the sum of the appropriate entries in columns 4-8 and columns 10-14 of Table 3.4-4.

This completes the example projection and allocation of industrial process sources for 1980; 1985 projections are calculated in a similar manner and are not presented here in the interest of brevity.

TABLE 1: ESTIMATED CONTROL FACTORS FOR SOURCES AFFECTED BY FEDERAL NEW SOURCE PERFORMANCE STANDARDS (PROMULGATED AND PROPOSED) *

Year	Source Category	SCC Codes	Pollutant Emissions per Unit of Production				
			TSP	SO_x	NO_x	CO	HC
74	Municipal Incinerators > 50 tons per day	5-01-001-01 5-02-001-01 5-03-001-01	1.5 lb/ton feed (98%)				
74	Portland Cement Plants						
	kiln	3-05-006-(01,03-05) 3-05-007-(01,03-05)	0.3 lb/ton solids to kiln				
	clinker-cooler	3-05-006-02 3-05-007-02	0.1 lb/ton solids to kiln				
74	Nitric Acid Plants	3-01-013-(01-08)			3.0 lb/ton 100% acid (93%)		
74	Sulfuric Acid Plants	3-01-023-(01-18)		4.0 lb/ton 100% acid (96%)			
75	Steam Generators (> 250 MBTU/hr)						
	coal-fired	1-01-001-(01-02) 1-01-002-(01-05) 1-01-003-(01-06) 1-02-001-(01-02) 1-02-002-(01-05) 1-02-003-(01-06)	0.2 lb/10^6 BTU (98%)	1.2 lb/10^6 BTU (90%)	0.7 lb/10^6 BTU (except lignite)		

* The emission estimates presented in this table are preliminary estimates of NSPS extracted from draft technical support material. The table is presented for illustrative purposes only and for use in supplying data used in the "hypothetical example" in this supplement. Persons using the Volume 13 Supplement should consult the appropriate Regional Office for most current information.

TABLE 1: ESTIMATED CONTROL FACTORS FOR SOURCES AFFECTED BY FEDERAL NEW SOURCE PERFORMANCE STANDARDS (PROMULGATED AND PROPOSED)

Year	Source Category	SCC Codes	Pollutant Emissions per Unit of Production				
			TSP	SO_x	NO_x	CO	HC
	oil-fired	1-01-004-01 1-01-005-01 1-02-004-01 1-02-005-01 1-03-004-01 1-03-005-01	0.2 lb/10^6 BTU (98%)	0.8 lb/10^6 BTU (70%)	0.3 lb/10^6 BTU		
	gas-fired	1-01-006-01 1-02-006-01 1-03-006-01	0.2 lb/10^6 BTU		0.2 lb/10^6 BTU		
76	Asphalt Concrete Plants	3-05-002-(01-02)	1.35 lb/ton of asphalt produced (98%)				
76	Petroleum Refineries						
	Process Gas Heaters	3-06-001-(02,04)		0.9 gr SO_2/dscf of process gas (99+%)			
	Catalytic Regenerators	3-06-002-01 3-06-003-01	18 lb/10^3 BBL feed (93%)				
76	Petroleum Storage (over 65000 gal. capacity)	4-03-001-(01-61) 4-03-002-(01-16) 4-03-003-(02-14)					
	Petroleum Storage and Transfer						Working Loss lb/BBL
	Motor Gasoline						0.012
	Crude Oil						0.048

TABLE 1: ESTIMATED CONTROL FACTORS FOR SOURCES AFFECTED BY FEDERAL NEW SOURCE PERFORMANCE STANDARDS (PROMULGATED AND PROPOSED)

Year	Source Category	SCC Codes	Pollutant Emissions per Unit of Production				
			TSP	SO_x	NO_x	CO	HC
	Aviation Gas						0.055
	Special Naphtha						0.056
	Jet Fuel						0.054
	Kerosene						------
	Distillate Oil						------
							Breathing Loss lb/BBL
	Motor Gasoline						0.29
	Crude Oil						1.56
	Aviation Gas						1.35
	Special Naphtha						1.30
	Jet Fuel						0.65
	Kerosene						0.30
	Distillate Oil						0.29
76	Sewage Treatment Plants (Sludge Incinerators)	5-01-005-06	1.3 lb/ton dry sludge (99.6%)				
76	Turbines						
	oil	2-01-001-01 2-01-003-02 2-01-004-01 2-01-005-01 2-01-006-01 2-02-001-01 2-02-004-02 2-02-005-01 2-02-006-01 2-02-007-01		145 ppm @ 15% oxygen or 0.8 lb $SO_2/10^6$ BTU input	75 ppm @ 15% oxygen	215 ppm ($<$ 50 MBTU) 90 ppm ($>$ 50 MBTU) @ 15% oxygen	

TABLE 1: ESTIMATED CONTROL FACTORS FOR SOURCES AFFECTED BY FEDERAL NEW SOURCE PERFORMANCE STANDARDS (PROMULGATED AND PROPOSED)

Year	Source Category	SCC Codes	Pollutant Emissions per Unit of Production				
			TSP	SO_x	NO_x	CO	HC
	gas	2-01-002-01 2-01-003-02 2-01-007-01 2-02-002-01 2-02-008-01		same as above	55 ppm @ 15% oxygen	same as above	
77	Secondary Lead Smelters and Refineries	3-04-004-(01-04)	0.022 gr/dscf (97+%)				
77	Secondary Brass & Bronze Refining (Reverberatory Furnaces)	3-04-002-(05,06)	0.022 gr/dscf (98.7%)				
77	Iron & Steel Mills (Basic Oxygen Furnace)	3-03-009-03	0.022 gr/dscf (99.8%)				
77	Gasoline Marketing	4-06-001-(01-55)					0.012 lb/BBL
	Bulk Transfer of Motor Gasoline	4-06-002-(01-30) 4-06-003-(01-05)					0.034 lb/BBL
	Service Station Refueling	4-06-004-(01-02)					0.076 lb/BBL
77	Stationary Internal Combustion Engine						
	Spark Ignition	2-01-001-02 2-01-002-02 2-01-003-01 2-01-999-(97-98)	Not Available	Not Available	94.1 lb/BHP-yr	Not Available	Not Available

TABLE 1: ESTIMATED CONTROL FACTORS FOR SOURCES AFFECTED BY FEDERAL NEW SOURCE PERFORMANCE STANDARDS (PROMULGATED AND PROPOSED)

Year	Source Category	SCC Codes	Pollutant Emissions per Unit of Production				
			TSP	SO_x	NO_x	CO	HC
	(Spark Ignition cont'd)	2-02-001-02 2-02-002-02 2-02-003-01 2-02-004-01 2-02-008-02 2-02-999-(97-98)					
	Diesel & Dual Fuel	same as above	0.68 lb/BHP-yr	2.9 lb/BHP-yr	49.7 lb/BHP-yr	16.4 lb/BHP-yr	3.4 lb/BHP-yr
78	Primary Copper Smelters (Roaster, Furnace, Converter)	3-03-005-(01-05)		38 lb/SO_2/ton of metal produced (99.5%)			
78	Primary Zinc Smelters (Roasters, Sintering Machines)	3-03-030-(01-06)	0.44 lb/ton of produced (99.5%)	115 lb SO_2/ton of metal produced (99.5%)			
78	Primary Lead Smelters (Sintering Machines, Conververters, Electric Smeltering Furnace)	3-03-010-(01-03)	0.18 lb/ton of metal produced (99.5%)	108 lb SO_x/ton of metal produced (91%)			
78	Primary Aluminum Reduction Plants (Pot Lines, Bake Plants)	3-03-001-(01-05)	2.0 lb(as F)/ton of metal produced				

TABLE 1: ESTIMATED CONTROL FACTORS FOR SOURCES AFFECTED BY FEDERAL NEW SOURCE PERFORMANCE STANDARDS (PROMULGATED AND PROPOSED)

Year	Source Category	SCC Codes	Pollutant Emissions per Unit of Production				
			TSP	SO_x	NO_x	CO	HC
78	Coal Cleaning Plants						
	Air Tables	3-05-010-99	0.18 gr/dscf (90+%)				
	Thermal Driers	3-05-010-(01-03)	0.03 gr/dscf (99%)				
78	Iron & Steel Mills (Electric Arc Furnaces)	3-03-009-(04-05)	0.004 gr/dscf (.01 lb/ton metal) (97.4%)				
78	Ferro Alloy Production	3-03-006-(01-04) 3-03-006-05 3-03-007-01	1.0 lb/MW-hr (99.7%) 0.5 lb/MW-hr (99.7%)				
78	Calcium Carbide	3-05-004-01	0.5 lb/MW-hr (99.7%)				
78	Grain Handling	3-02-005-(01-04) 3-02-006-(01-99)	0.01 gr/scf (99.6%)				
78	Lime Plants (Rotary Kiln)	3-05-016-04	0.3 lb/ton of product				
78	Asphalt Roofing Plants (Saturation & Drier)						
	Roofing Felt	3-05-001-(01-04)	0.08 lb/ton felt	0.05 lb/ton felt			.06 lb/ton felt
	Shingles	3-05-001-(01-04)	0.035 lb/ton shingles	0.036 lb/ton shingles			.043 lb/ton shingles

TABLE 1: ESTIMATED CONTROL FACTORS FOR SOURCES AFFECTED BY FEDERAL NEW SOURCE PERFORMANCE STANDARDS (PROMULGATED AND PROPOSED)

Year	Source Category	SCC Codes	Pollutant Emissions per Unit of Production				
			TSP	SO_x	NO_x	CO	HC
79	Kraft Pulp Mills						
	Recovery Furnace	3-07-001-04	2 lb/ton pulp				
	Lime Kilns	3-07-001-06	0.5 lb/ton pulp				
	Smelt Dissolving Tank	3-07-001-05	0.3 lb/ton pulp				
79	Sulfur Recovery Plants in Petroleum Refineries	3-01-032-(01-99)		4 lb SO_2/1000 lb of sulfur input (99.8%)			
79	Gasification of Fossil Fuels (coal only)			4 lb SO_2/1000 lb of sulfur input (99.8%)			
79	Carbon Black Plants (Furnace Baghouse)	3-01-005-04 3-01-005-05	11 lb/ton C produced			4.5 lb/ton C produced	0.57 lb/ton C produced
79	Sintering Plants in Iron & Steel Mills	3-03-008-03	0.42 lb/ton sinter				5.9 lb/ton sinter
79	Detergent Plant (Spray Drier)	3-01-009-01	0.5 lb/ton product				
79	Crushed Stone Plants (Drilling, Crushing, Screening and Conveying)	3-05-020-(01-09)	0.31 lb/ton				
79	Gray Iron Foundries (Electric Furnaces)	3-04-003-03	0.045 lb/ton metal produced				

TABLE 1: ESTIMATED CONTROL FACTORS FOR SOURCES AFFECTED BY FEDERAL NEW SOURCE PERFORMANCE STANDARDS (PROMULGATED AND PROPOSED)

Year	Source Category	SCC Codes	Pollutant Emissions per Unit of Production				
			TSP	SO_x	NO_x	CO	HC
80	By-Product Coke Ovens (Ovens & Larry Car Coolers & Chemical Recovering Plant)	3-03-003-(01-06)	0.35 lb/ton of coke produced				0.63 lb/ton of coke produced
80	Fossil Fuel Gasification (Shale & Petroleum Oils)			4 lb SO_2/1000 lb of sulfur input			
80	Sulfur Recovery Plants Production Facilities (Everything outside a refinery)	3-01-032-(01-03)		4 lb SO_2/1000 lb of sulfur recovered			
81	Refuse Combustion in Steam Generators	1-01-012-01 1-02-012-01 1-03-012-01	0.2 lb/10^6 BTU	1.2 lb/10^6 BTU	0.7 lb/10^6 BTU		
82	Lignite - Fired Steam Generators	1-01-003-(01-06) 1-02-003-(01-06)	0.2 lb/10^6 BTU	1.2 lb/10^6 BTU	0.7 lb/10^6 BTU		
83	Primary Aluminum Ore Reduction						
	Bauxite Processing	3-03-000-01	0.12 lb/ton bauxite (98%)				
	Calcining	3-03-002-01	4 lb/ton processed (98%)				
83	Gray Iron Foundries	3-04-003-(01-02)	0.2 lb/ton iron (99%)			5% of uncontrolled emissions	
83	Fiberglass Manufacturing	3-05-012-(01-05)	Not Available				

TABLE 1: ESTIMATED CONTROL FACTORS FOR SOURCES AFFECTED BY FEDERAL NEW SOURCE PERFORMANCE STANDARDS (PROMULGATED AND PROPOSED)

Year	Source Category	SCC Codes	Pollutant Emissions per Unit of Production				
			TSP	SO_x	NO_x	CO	HC
83	Clay Products	3-05-008-(01-03) 3-05-009-(02-03) 3-05-003-(01-06)	4.5 lb/ton				
83	Secondary Lead Smelters						
	Blast Furnace	3-04-004-03	3.29 lb/ton lead	0.48 lb/ton lead			
	Reverberatory Furnace	3-04-004-(02,04)		2.12 lb/ton lead	0	0	
83	Secondary Alum. Smelters (Fluxing)	3-04-001-(01-04)	10 lb/ton				
83	Castable Refractories	3-05-005-(01-05)	1.57 lb/ton				
83	Gypsum Manufacturing	3-05-015-(01-04)	0.3 lb/ton product (99.8%)				
83	Polyethylene						
	High-density						0.5 lb/ton product
	Low-density						0.25 lb/ton product
83	Pulp Mills (Fluid Bed Reactors)	3-07-001-08	0.039 lb/ton of pulp produced				
83	Beehive Coke Ovens	3-03-004-01	0.35 lb/ton of coke				

TABLE 1: ESTIMATED CONTROL FACTOPS FOR SOURCES AFFECTED BY FEDERAL NEW SOURCE PERFORMANCE STANDARDS (PROMULGATED AND PROPOSED)

Year	Source Category	SCC Codes	Pollutant Emissions per Unit of Production				
			TSP	SO_x	NO_x	CO	HC
83	Ammonium Nitrate Fertilizer Plants	3-01-027-(01-06)	0.254 lb/ton fertilizer				
83	Cotton Ginning	3-02-004-(01-03)	0.012 lb/ton cotton produced				
83	Ammonium Sulfate Fertilizers		1.0 lb/ton product				
83	Explosives	3-01-010-(01-06)			2.3 lb/ton		
83	Formaldehyde					1.35 lb/ton product	0.28 lb/ton product
83	Small Boilers	All boiler SCC Codes except those > 10^8 BTU/hr			0.058 lb/10^6 BTU		
83	Surface Coatings-Auto Assembly	4-02-(001,003-006, 008-009)-01					10% of uncontrolled 0.42 lb/automobile
83	Acrylonitrile	3-01-026-08				0.18 lb/ton product	0.165 lb/ton product
83	Ethylene Dichloride						0

TABLE 1: ESTIMATED CONTROL FACTOPS FOR SOURCES AFFECTED BY FEDERAL NEW SOURCE PERFORMANCE STANDAPDS (PROMULGATED AND PROPOSED)

Year	Source Category	SCC Codes	Pollutant Emissions per Unit of Production				
			TSP	SO_x	NO_x	CO	HC
83	Primary Copper Crushing (ore)	3-03-005-01 3-03-005-06	1.12 lb/ton of ore processed				
83	Secondary Cu						
	Smeltering/Refining	3-03-005-(03,05)	0.34 lb/ton CU produced				
	Handling		0.85 lb/ton CU produced				
83	Ethylene Oxide						
83	Carbon Black (channel)	3-01-005-01	23 lb/ton of C produced				3.92 lb/ton product
83	Glass Manufacturing	3-05-014-(01,10-12)	0.02 lb/ton of glass produced				
83	Sodium Carbonate		0.58 lb/ton product				
83	Conical Incinerators	5-01-005-05 5-01-001-(04-05) 5-03-001-(04-05)	6.7 lb/ton material combusted				
83	On-site Incineration	5-01-001-(01-02) 5-01-005-99 5-02-001-(01-03) 5-02-003-(01-02) 5-03-001-(01-03) 5-03-005-99	3.78 lb/ton material combusted				
83	Phthalic Anhydride (O-Oxylene)	3-01-019-03				0.2 lb/ton produced	5.0 lb/ton produced
83	Ethylene Dichloride (Oxychlorination)					0.16 lb/ton produced	1.4 lb/ton produced

Table 3.4-1
Point Source Industrial Process Emissions

A. County XYZ
B. Year 1975 (BASELINE). ASSUMES EXISTING SOURCES ARE IN COMPLIANCE WITH EXISTING REGULATIONS
C. Allocation Order 1, 2, and 3

(1) Industrial Process Category	Source Identification					Process Emission Forecast (tons/yr)											
	(2) Name	(3) Process	(4) Subarea	(5) Coord.		(6)	(7) Part.		(8) SO_x		(9) CO		(10) HC		(11) NO_x		(12)
				X	Y	GF**	Cont.	Emis.	Cont.	Emis.	Cont.	Emis.	Cont.	Emis.	Cont.	Emis.	Emp.*
IRON & STEEL BOF	ABC STEEL CO.	3-03-009-03	A	X_1	Y_1	1.0	1.0	5000			1.0	1000					200
PRIMARY CU SMELTER	DEF COPPER CO.	3-03-005-( )	A	X_2	Y_2	1.0	1.0	50	1.0	500							200
CLAY PROD.	GHI CLAY CO.	3-04-003-( )	A	X_3	Y_3	1.0	1.0	250									100

*Employment
**Growth Factor

Table 3.4-1
Point Source Industrial Process Emissions

A. County XYZ
B. Year 1980
C. Allocation Order 1, 2, and 3

(1) Industrial Process Category	Source Identification					Process Emission Forecast (tons/yr)												
	(2) Name	(3) Process	(4) Subarea	(5) Coord.		(6)	(7) Part.		(8) SO_x		(9) CO		(10) HC		(11) NO_x		(12)
				X	Y	GF**	Cont.	Emis.	Cont.	Emis.	Cont.	Emis.	Cont.	Emis.	Cont.	Emis.	Emp.*
IRON & STEEL (BOF)	ABC STEEL Co	3-03-009-03	A	X_1	Y_1			5110				1100					221
PRIMARY CU SMELTER	DEF COPPER CO.	3-03-005-( )	A	X_2	Y_2			58		536							231
CLAY PROD.	GHI CLAY CO.	3-04-008-( )	A	X_3	Y_3			283									113

*Employment
**Growth Factor

Table 3.4-1
Point Source Industrial Process Emissions

A. County XYZ
B. Year 1985
C. Allocation Order 1, 2, and 3

(1) Industrial Process Category	Source Identification (2) Name	(3) Process	(4) Subarea	(5) Coord. X	(5) Coord. Y	(6) GF**	(7) Part. Cont.	(7) Part. Emis.	(8) SO_x Cont.	(8) SO_x Emis.	(9) CO Cont.	(9) CO Emis.	(10) HC Cont.	(10) HC Emis.	(11) NO_x Cont.	(11) NO_x Emis.	(12) Emp.*
IRON & STEEL (BOF)	ABC STEEL CO.	3-03-009-03	A	X_1	Y_1			5121				1210					244
PRIMARY CU SMELTER	DEF COPPER CO.	3-03-005-( )	A	X_2	Y_2			67		545							267
CLAY PROD.	GHI CLAY CO.	3-04-003-( )	A	X_3	Y_3			307									128

*Employment
**Growth Factor

Table 3.4-2

Industrial Point and New Source Process Emissions by Process Category
(All Subareas in County)

A. County XYZ
B. Year 1980
C. Allocation Order 2 and 3

(1) Industrial Process Category	Baseline Year Existing Point Sources						Forecast Year - All Sources							Forecast Year Existing Point Sources						Forecast Year - New Sources										
	(2) Part.	(3) SO_x	(4) CO	(5) HC	(6) NO_x	(7) Emp.*	(8) GF**	(9) Part.	(10) SO_x	(11) CO	(12) HC	(13) NO_x	(14) Emp.*	(15) Part.	(16) SO_x	(17) CO	(18) HC	(19) NO_x	(20) Emp.*	(21) Part.		(22) SO_x		(23) CO		(24) HC		(25) NO_x		(26)
																				Cont.	Emis.	Cont.	Emis.	Cont.	Emis.	Cont.	Emis.	Cont.	Emis.	Emp.*
IRON & STEEL (BOF)	1500		3000			600		1540		3400			680	1520		3200			640		200				200					40
3-03-009-03																														
PRIMARY Cu SMELTER	200	2000				800		238	2160				950	220	2080				875		18		80							75
3-03-005-( )																														
CLAY PRODUCTS	1000					400		1160					464	1080					432		80									32
3-04-003-( )																														
D. GRAND TOTAL																														

*Employment
**Growth Factor

Table 3.4-3

Process Emissions by Process Category and Subarea

A. County XYZ
B. Subarea A
C. Year 1980
D. Allocation Order 2 and 3

Industrial Process Category (1)	Total Emp. (2)	Point Source Emp. (3)	New Source Emp. (4)	EAP* (5)	New Source Emissions (tons/yr)				
					(6) Part.	(7) SO_x	(8) CO	(9) HC	(10) NO_x
IRON & STEEL BOF	340	320	20	0.5	100		100		
3-03-009-03									
PRIMARY Cu SMELT.	425	412	13	0.173	3	14			
3-03-005-( )									
CLAY PRODUCTS	232	216	16	0.5	40				
3-04-003-( )									
E. SUBAREA TOTAL									

*Employment Allocation Proportion = $\frac{\text{Subarea Category New Source Employment}}{\text{Total Category New Source Employment}}$ $\frac{\text{(Col. 4)}}{\text{(Col. 26, Table 3.4-2)}}$

Table 3.4-4

A. County XYZ
B. Subarea A
C. Year 1980
D. Allocation Order 1, 2, and 3

Industrial Point and New Source Process Emissions - Subarea Summary

Industrial Process Category (1)	Point Source Emissions							New Source Emissions						Total Emissions					
	(2) No. of Sources	(3) Emp.*	(4) Part.	(5) SO_x	(6) CO	(7) HC	(8) NO_x	(9) Emp.*	(10) Part.	(11) SO_x	(12) CO	(13) HC	(14) NO_x	(15) Emp.*	(16) Part.	(17) SO_x	(18) CO	(19) HC	(20) NO_x
IRON & STEEL-BOF	2	320	7600		1600			20	100		100			340	7700		1700		
3-03-009-03																			
PRIMARY CU SMELT.	2	412	100		980			13	3		14			425	103	994			
3-03-005-( )																			
CLAY PRODUCTS	2	216	500					16	40					232	540				
3-04-008-( )																			
E. GRAND TOTAL																			

*Employment

ATTACHMENT

EXCERPT FROM VOLUME 7: PROJECTING COUNTY EMISSIONS, GUIDELINES FOR AIR QUALITY MAINTENANCE PLANNING AND ANALYSIS

"(3) The Effect of New Source Performance Standards on Forecasted Emissions

The value for the future equivalent control efficiency to be "plugged into" the emissions equation is usually a function of the laws and regulations already agreed upon by the State agencies and EPA. There are, however, some industrial processes that are now, or are likely to be, subject to Federal New Source Performance Standards (NSPS). Some NSPS became effective in 1971 while others will be implemented in 1975. Still others will probably be in effect by 1980 or by 1985. Preliminary estimates of the emission reductions resulting from these promulgated and proposed NSPS have been tabulated by EPA for use in Air Quality Maintenance emission projections and can be obtained from the AQMA representative in each EPA Regional Office. This reference specifies either the required control efficiency (percent removal of uncontrolled emissions) or the maximum amount of pollutant allowed per unit of activity for each process likely to be affected by NSPS between 1974 and 1985.

Federal NSPS apply to the following industrial activities:

(a) New equipment installed in an existing facility

(b) Replacement of obsolete equipment within an existing facility

(c) All equipment in a new facility.

Federal NSPS do not apply to utilization of idle capacity, however,

Thus, three different situations can exist for an industrial process subject to NSPS:

(a) The entire facility is subject to NSPS

(b) Part of the production is subject to NSPS and no other laws affect the remaining production

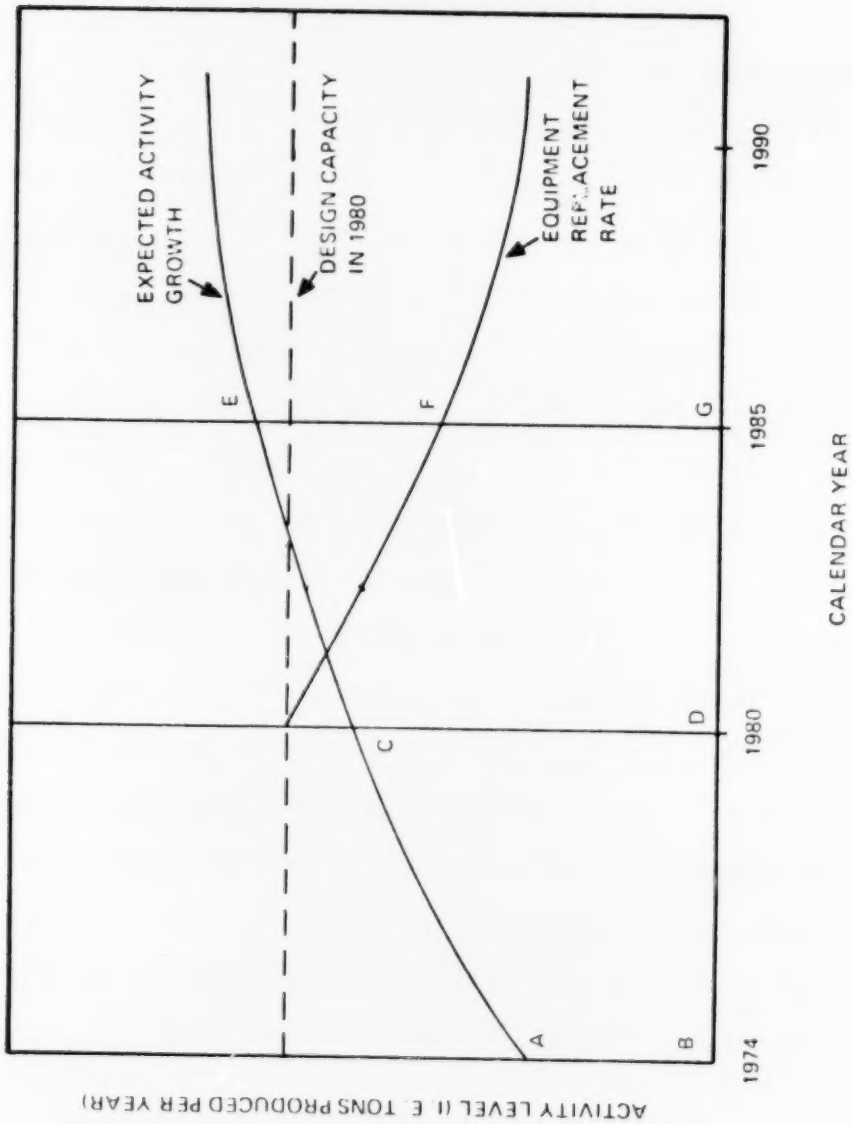
(c) One part of the production is subject to NSPS and the remainder is subject to a local agency regulation.

Exhibit 1 depicts plan information for a source that is currently subject to a local regulation or compliance schedule and also will be subject to a NSPS in 1980. The objective of this example is to show, in general, how to estimate 1985 emissions when one portion of the 1985 source production will be subject to a NSPS and the remainder will still be subject to the local regulation. This method is also valid when the NSPS is the sole control regulation affecting the industrial process. Before constructing a graph similar to Exhibit 1, the following data must be collected for the point source under investigation:

(a) Production rate for the base year (obtained via interviews)

(b) Design capacity (obtained via interviews)

EXHIBIT 1
Sample Plant Projections



(c) Replacement rate of obsolete process equipment (obtained via interviews or assume twice equipment lifetime allowed by the Internal Revenue Service for tax purposes*).

(d) Future activity growth rate obtained via interviews or from generalized growth projections (e.g., OBERS[**]).

The following procedure was used to construct the graph in Exhibit 1:

(a) Draw a horizontal line representing the design capacity for the year in which the NSPS becomes effective

(b) Draw the expected activity growth pattern starting at the projection level for the base year

(c) Draw a line representing the rate obsolete process equipment is replaced; start the line on the year that the NSPS becomes effective.

Line E-F represents the portion of 1985 production expected to be subject to the NSPS whereas line F-G represents 1985 production subject to the local regulations. Total 1985 emissions are calculated by inserting the appropriate activity values and required control efficiencies into the emission equation and summing the results.

It has been assumed in the above example that the proposed NSPS is more stringent in limiting emissions than the existing local regulations. If this is not the case, the local regulation should be applied to the entire 1985 production."

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*U.S. Department of the Treasury, Internal Revenue Service, Depreciation Guidelines and Rules. Pub. No. 456, Washington, D.C., August 1964.

[**1972 OBERS Projections--Economic Activity in the U.S. Volume 5: Standard Metropolitan Statistical Areas. Prepared by the U.S. Departments of Commerce and Agriculture for the U.S. Water Resources Council, Washington, D.C., April, 1974.]